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# REMARKS ON SPINAL INJURIES,

MORE ESPECIALLY

“RAILWAY SPINE,”

WITH HINTS ON EXPERT TESTIMONY.

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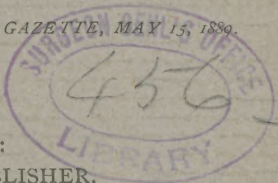
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REMARKS ON SPINAL INJURIES,  
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With Hints on Expert Testimony.

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GENTLEMEN:—Numerous interesting topics, especially the various medico-legal relations of insanity, have been discussed *in extenso* by this Society, but, up to the present time, the extremely important subject of railway injuries has received little, if any, attention. You are all, doubtless, aware that annually many thousands of dollars are paid by railway companies, in the form of damages, for injuries claimed to have been received. The sums that have been paid out are in the aggregate very large, it being estimated by one writer that in the course of about a dozen years at least twenty million dollars have been paid out in this country and in England. Large as this amount seems, it should in nowise prejudice us in approaching the subject either as a whole or in testing the merits of any indi-



vidual case. Let us bear in mind that whether this sum is to be looked upon as indicative, on the one hand, of the excessive number and frightful character of railroad accidents, or, on the other, of fraud on the part of plaintiffs, or of excessive sympathy on the part of juries, it can in no way enter into the discussion before us. At most, it merely illustrates the magnitude of the subject, or, perhaps, impresses us with the very great importance of expert testimony. How important this testimony is, few will fail to realize. The result in many, if not in most, cases, hinges entirely upon it. The accuracy of statement, the nicety of judgment, the personal integrity of the expert not infrequently turn the scale.

It is with some diffidence that I bring this subject before you. It is so extensive that I can only deal with its various parts briefly and in a general way. A volume would be required to do it justice. Further, the position I hold to-night is one of peculiar difficulty. In order to meet the needs of the occasion, I must speak as much as possible in language which our legal brethren, who are not supposed to have a knowledge of medical terms, can understand, while at the same time I must be technically accurate. Much also of what I shall say would be omitted in an address before a purely medical society, but which, if omitted here, would make my discourse unintelligible to one-half my hearers.

The injuries to which I invite your attention are injuries of the spine, more especially those which come under the head of "railway spine." The term railway spine

is in many respects objectionable. It may convey the erroneous impression that there is some one clearly-defined affection of the spine to which it should be restricted, while in truth the injuries of the spine liable to occur in railway accidents are most various. Further, the expression implies that there is something peculiar in the injuries produced by railways, and that they differ from injuries from other causes, whereas the most varied accidents may produce identical conditions. Such, for instance, may be the case with a simple fall upon the back, the shock of an explosion, or a blow received from the timbers of a falling building. However, the term railway spine is in common use, and as long as we interpret it as signifying in a general way the various conditions resulting from blows, falls, wrenching, or jarring of the back, we run no risk of creating confusion by its use.

Injuries of the back are, of course, various in kind and degree. We may have in one case merely a bruise of the back, in another an actual fracture of the spinal column, and in another, still, marked nervous symptoms, without any visible signs of injury whatever. We find, then, at the very outset of our inquiry, a crude yet practical classification of spinal injuries presenting itself. In the first group we have those cases in which the various tissues of the back, the ligaments, nerves, and muscles, have been bruised or have otherwise suffered from strain,—*i.e.*, cases in which there has been no actual damage to the spine or its contents, but merely to the tissues immediately surrounding or in proximity to it.

In the second group, in addition to fracture of the spine, we should include dislocation of the vertebræ at the time of the accident. It should be remembered that in these cases hemorrhage into the spinal marrow or its coverings and spinal concussion may occur as complications. The third group will include all those cases in which nervous symptoms are marked, but in which external proof of accident may be wanting,—*i.e.*, it includes, first, cases of injury to the spinal contents, such as concussion, hemorrhage, and late oncoming inflammation and degeneration; and, secondly, those cases in which no other symptoms are present than those of a persistent loss of nervous tone or that unstable state which we call hysteria.

You will say at once that groups two and three overlap; and, again, as regards groups one and two, that a blow sufficient to break the back must of course be sufficient to bruise the muscles and ligaments: in other words, that the various groups I have made merge into one another. Classifications are merely pegs on which to hang our ideas, and I believe that such a one as I have given you is more useful for our present purposes than a more elaborate classification based solely upon symptomatology.

Regarding group one, I shall have very little to say, as the diagnosis of the condition is relatively easy. The skin of the back is very dense and thick, and frequently powerful blows produce little discoloration, so that it not infrequently happens that in cases where the underlying muscles and ligaments have severely suffered, the skin itself exhibits no



change. The muscles, on the other hand, occasionally exhibit decided swelling and distortion. The principle symptoms, however, on which we have to rely are excessive tenderness and pain on motion. Sprains of the ligaments are indicated by great rigidity of the spine, intense pain on motion, and often by involuntary spasm of the various spinal muscles, the spasm being likewise provoked by attempted motions. In some cases transmitted shock—*e.g.*, a slight vertical blow upon the head—causes acute suffering at the point of injury.

As you would naturally expect, these sprains of the back are more apt to be caused by accidents, which cause sudden flexion or sudden twisting of the body, and the history of the accident should, therefore, be taken into account in investigating a doubtful case.

As regards the outcome of these cases, it may be said that very many of them get well, but that rest in the recumbent posture for weeks, and often months, is necessary. Sprains of the muscles present, of course, a much more favorable outlook than sprains of the ligaments. The following cases, taken from my own experience, will illustrate this point: A medium-weight woman, aged 55 years, fell down a short flight of stairs, landing in such a way that the lumbar region struck the last step with great force. In addition to the temporary shock and nervousness of the accident, the patient complained of great pain in the region of the left quadratus lumborum muscle. Inspection revealed it to be much swollen and exquisitely tender, and in its lower third a distinct groove or ditch could be made

out by the fingers, as though some of the fibres had parted from their tendinous insertion into the innominate bone. The patient was kept in bed over four weeks, and even at that time tenderness and pain had not altogether disappeared. Another case is that of an old gentleman, 78 years of age, but in excellent health and of a very long-lived stock. He was thrown forward, while standing, by the unexpected starting of a train. He fell at full length, striking in his course his forehead against the door of the car in such a way that his head and neck were bent violently backward. When I saw him his head was held in an absolutely fixed position, while the tissues of the neck were everywhere exquisitely sensitive to deep pressure, and the slightest jar would give excruciating pain. The muscles of the back of the neck were hard and rigid, as though in constant spasm. In this case, the man being in comfortable circumstances, the question of a suit for damages was never raised, and he certainly was very anxious to get well. Several months afterwards, when last heard from, there had been no change in his condition. It is extremely probable that in this case the dense fibrous tissues comprising the ligaments of the spinal column, the intervertebral cartilages, and the numerous tendinous insertions of the muscles had been strained, so that the outlook, as far as speedy recovery was concerned, was not very favorable. It is worthy of remark that at no time were there any symptoms referable to injury of the spinal marrow.

I might multiply these cases almost indefi-



nately by citing from the records of various writers, especially the cases of Hilton.\* However, my object to-night is to give expression to general principles rather than to detail.

In sprain of the back or spine, therefore, the symptoms to be sought for are rigidity, pain, tenderness, and frequently involuntary spasm of muscles on attempting passive movement. Tenderness should be sought for over the muscles and with deep pressure. The expert must be careful in doubtful cases not to confound this condition with hysterical hyperæsthesia affecting the skin, or with the so-called painful spine of hysterical and neurasthenic subjects; the tenderness in these instances is, of course, superficial.

In giving a prognosis in sprained back, the expert should be guided, in addition to general principles, by the fact that cases of mere muscle sprain progress more favorably than those in which the ligaments have suffered, and especially, do I think, should he be guarded in his opinion if pain is readily excited by transmitted shock; the latter symptom suggesting among other things injury of the intervertebral cartilages or the bodies of the vertebræ themselves. Further, nervous symptoms, such as I shall speak of later, should be carefully sought for, in order to exclude possible injury of the spinal contents. Again, the relation of blows and falls to the development of Pott's disease, is well known, and the expert should bear it in mind. An interesting illustration of this often late oncoming affection is afforded by a patient now

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\* Hilton, "On Rest and Pain." Wood & Co., 1876.

in the wards of the Philadelphia Hospital. He is a middle-aged man, who, while walking, was struck on the shoulders by a heavy bale of rags, the bale falling from the height of a third floor. The blow caused him to sit down suddenly on the pavement, while his thorax was forcibly flexed upon his abdomen. After recovering from a momentary shock, he walked to his home. Here he remained a little over two weeks, suffering the while with pain in the back. At the end of this time he resumed his occupation,—that of a carpenter,—and the seriousness of his injury was not made evident until seven months after, when he began to lose power in his legs. At present he is decidedly paraplegic, and he suffers from marked displacement of the last dorsal and first lumbar vertebræ.

Another point to be remembered is, that severe contusions of the back are sometimes followed by bloody urine, due presumably to laceration of the tissue of the kidney. This symptom I have seen once in the case of a man who was squeezed between the bumpers of two cars. I have no time to enter further into the discussion of this symptom other than to say that a history of its presence invariably indicates that the accident was a severe one.

Let us now take up group second, which, I think, we can likewise dispose of briefly. It includes, as you will remember, fractures of the vertebræ and dislocations at the time of the accident. It is exceedingly improbable that gross fracture or displacement will require in courts of justice the services of an expert to establish their existence. The fact

and degree of injury are with few exceptions readily recognized even by the layman. In the so-called "latent fracture of the spine," however,—*i.e.*, cases in which the fracture is attended by little or no displacement,—the symptoms may simulate those of sprain. Time, however, will almost invariably reveal the truth. Consecutive inflammation, necrosis, abscesses tell the tale. Further, the symptoms at the outset are usually, but not always, indicative of injury to the spinal contents,—*i.e.*, we have more or less marked paralysis of motion and sensation and of the bladder and bowels.

The third group, to which I will now pass, includes all those cases which present nervous symptoms, and in which visible evidence of injury may be entirely wanting. The first of its subdivisions deals with cases of actual injury to the spinal contents, such as concussion, hemorrhage into the spinal marrow or its coverings, inflammatory changes, and late on-coming degeneration. The second subdivision deals with those cases in which no other symptoms are present than those of a persistent loss of nervous tone, or, symptoms referable to hysteria, complicated, it may be, by a psychosis. This group is undoubtedly by far the most important. Indeed, many writers appear to restrict the expression "railway spine" to this class of cases. They are sometimes extremely difficult of solution, and they have on more than one occasion given rise to hard-fought legal battles.

To begin with, it is extremely probable that a trauma sufficient to injure the dura mater, especially its internal layer, will also be at-



tended by actual damage of the spinal column, —*e.g.*, fracture, dislocation of the vertebræ, or later on-coming Pott's disease. Lidell,\* however, regards meningitis "as among the possible consequences of sprains or wrenches of the vertebral column," and then cites an apochryphal newspaper case as an instance. Leyden† speaks of a case of traumatic pachymeningitis which was hemorrhagic, but the case is valueless, as it was complicated by a fractured skull, and the man had in addition presented symptoms of disease previous to his fall. Leyden, however, describes another case in which, following severe blows upon the back in a railway accident, there were late on-coming symptoms associated, as the autopsy showed, with extensive pathological changes. There was marked myelitis, together with a tumor of the dura and pachymeningitis. He also records that the vertebral bodies in the neighborhood of the disease were eroded.

While traumatic pachymeningitis must be excessively rare, the expert should not maintain that its occurrence is an impossibility. A conceivable method of its occurrence is the following: Hilton declares, as you may know, that the intervertebral cartilages are frequently damaged in injuries of the spine, —*i.e.*, that there is a partial separation of the cartilage from the body of the vertebra. Should this be the case, it is not impossible

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\* Lidell, "Sprains, Twists, and Wrenches of the Back" ("International Encyclopædia of Surgery," vol. iv. p. 688).

† Leyden, *Klinik der Rückenmarkskr.*, vol. ii. 406; also *Archiv f. Psychiatrie*, etc., 1878, vol. viii. p. 31.

that inflammation should reach the dura by extension from the posterior vertebral ligament. However, apart from this occurrence being hypothetical, such an instance would come properly under the head of definite injury to the spinal column, and could not be classed as a simple uncomplicated traumatic meningitis. Still, it is not at all improbable that a perimeningitis, an affection which is external to the dura itself, can be set up by blows upon the back insufficient to produce actual disease of the bones.

Passing now to hemorrhage into the substance of the cord or into its membranes,—I mean, of course, gross and not capillary hemorrhage,—we enter a field where no doubt exists as to the possibility of the lesion. That it occurs, no one, not even Page, denies. When present, it produces such marked and grave symptoms that the fact of the patient being badly hurt is very evident. Hemorrhage into the substance of the cord is very frequently fatal, and in the few cases that live the permanent damage done is so unmistakable (wasting and paralysis) that the question for the expert to decide is not so much upon the fact of the injury as upon its extent, and even upon this latter point no great variance of opinion, I take it, would be likely to obtain.

As regards hemorrhage into the membranes, the gravity of the symptoms again places the average case beyond the range of question. It is only in those cases, again, in which a partial recovery takes place,—*i.e.*, in which the hemorrhage has been small in amount, or in which it has been low down in

the spinal canal,—that a legitimate discussion can arise as to the permanent injury. Regarding the method of study and the duty of the expert, I will defer my remarks until we have reached a later stage of the subject.

We next come to the subject of true spinal concussion. I say *true* spinal concussion because in many cases of railway spine, which are sometimes loosely spoken of as cases of spinal concussion, no concussion has at any time existed. For the benefit of our legal friends, let me say that by concussion of the brain or cord, we mean that the part which has received a blow suffers a loss or perversion of function, which is of greater or lesser duration. The change is sometimes accompanied by slight structural change, such as the escape of blood from the capillary vessels,—*i.e.*, by minute hemorrhages. Very often, however, no visible change can be detected, and the alteration, whatever it may be, is molecular, and has been compared by one of our writers to the loss of its properties by a magnet when it is struck a blow.

Concussion of the spinal cord, unlike the other conditions I have mentioned, has, on the one hand, been freely and excessively admitted, notably by Erichsen;\* and, on the other hand, has been as frantically and absolutely denied, notably by Page.† Let us see what one of our own clear-headed writers, a

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\* Erichsen, "On Concussion of the Spine." New York, 1882.

† Page, "Injuries of the Spine and Spinal Cord." London, 1883.



surgeon, has to say on the subject. Dr. William Hunt,\* after referring to the well-known anatomical relations of the spinal marrow, and showing how well the latter is protected by fat, connective tissue, and its various membranes, proceeds to discuss the subject as follows: "Clinical observation is, I think, of far greater value in determining questions of the kind than any theory, however strongly supported by anatomical facts. Does transient concussion of the spine occur as transient concussion of the brain occurs? Page, if I understand him, says not. In his work on "Injuries of the Spine and Spinal Cord" (London, 1883), in criticising a well-known case as to the claim of persistent paraplegia without discoverable lesion, he says: 'We italicize the word persistent, for simple concussion of the brain may give rise to a transient unconsciousness, and, if the analogy holds good, concussion of the spine should *per se* produce a transient paraplegia. *We know of no case, nor can we discover the history of any case, where this has happened.*'

"I italicize the last sentence. In 1881 a boy came under my care who was shot in the back three inches to the right of the third or fourth dorsal vertebra. He at once had characteristic symptoms in the legs of being wounded in the spine in such a way as to affect the cord somehow. There was partial paraplegia, with pains in both limbs. Under rest these symptoms soon disappeared. In a few days I made a deep incision and removed

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\* Hunt, "Concussion of the Spine," Pepper's System, vol. v. p. 913.

some clothing and fragments of bone, and then from the depths of the spinal gutter I took a large conical ball which was resting against the bony bridge of a vertebra. The boy recovered rapidly. I saw him some months afterwards, perfectly well.

"Surely this was a case of spinal shock or concussion with transient paraplegia, and the cause of it could have been nothing else than the impact of the ball against the column, producing vibratory jar sufficient to affect the cord. The immediate symptoms and the rapid and complete recovery are, in my opinion, inconsistent with any theory of congestion or pronounced lesion of the medulla."

Another case recorded by Dr. Hunt was that of a man who, falling from a considerable height, landed on his feet. The force of the impact was sufficient to fracture both calcanea. In addition there was paralysis of the legs and loss of control over the bladder and bowels. The man recovered, the spinal symptoms improving along with the fractures.

As a third instance, the doctor cites the well-known case of President Garfield, in whom a bullet struck the spinal column, concussed the cord, and produced temporary loss of power in the legs.

These cases, then, constitute undoubted and undeniable concussion. However, from the further reading of Dr. Hunt's article, I infer that he limits the effect of concussion to *transient* loss or perversion of function, and that he is indisposed, to say the least, to admit any degree of permanence or chronicity or late appearance of symptoms.

The following case from my own experience certainly proves that symptoms accompanying shock may persist indefinitely : I was called one Sunday evening to a man 45 years old, who, while in a condition of average health, had fallen down a narrow and crooked stairway. Though not intoxicated, he admitted that he had been drinking. He fell backward in such a way that he landed upon the last step, striking it almost vertically with the shoulders and back of the neck. When I saw him he was much shocked and depressed and unable to move hand or foot, and his pupils were dilated. The next day I saw him again, and he was still completely paralyzed in both arms and legs. There was decided impairment of sensation, though it was nowhere lost. Respiration appeared to be almost entirely diaphragmatic. There was retention of urine, and the bowels were obstinately constipated. There was at no time any vomiting. Under rest and various simple measures the man made an almost complete recovery. I say *almost*, because just here lies the point of special interest. At the end of six weeks he had so far recovered the use of his legs as to be able to leave his bed, and, to a certain extent, had regained power in his arms. The deltoids, however, were as yet almost completely paralyzed, and there was decided weakness of almost all the other arm muscles, especially of the extensors of the forearms. Sensation had become normal. He remained under my care for several weeks longer without any improvement in the condition of the arms, and about a year later, when I saw him again,



decided wasting had taken place in the paretic muscles.\*

Here certainly is a case in which spinal concussion was followed by persistent symptoms, symptoms, too, which are referable to organic changes in the cord. That organic changes of the cord result from blows and shocks to the back is maintained by authorities of no less weight than Spitzka, Gowers, and Edes. Spitzka, for instance, states that both in posterior sclerosis and in disseminated sclerosis the origin of the trouble can be traced in individual cases to shock and injury. Speaking particularly of disseminated sclerosis, Spitzka† says: "Railway spine is undoubtedly the mask of a disseminated inflammatory trouble in a number of cases." Edes‡ has called attention to the "somewhat frequent occurrence of degeneration of the posterolateral columns of the spinal cord in so-called spinal concussion," and has placed on record four cases, one of which he verified by a post-mortem examination. Some of the most valuable testimony, however, is offered by Dr. Gowers,§ who not only places blows upon the

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\* Since writing the above I have had the opportunity of again examining this man. Five years have now elapsed since his fall, and the palsy of the deltoid and upper-arm muscles persists unchanged. The wasting, however, does not seem as marked.

† Spitzka, "Disseminated Sclerosis," *Pepper's System*, vol. v. p. 884.

‡ Edes, *Boston Medical and Surgical Journal*, September 21, 1882.

§ Gowers, "Diseases of the Nervous System," Philadelphia, 1888, pp. 434 *et seq.* Also, Duménil et Petil, "Commotion de la Moelle Épinière," *Archives de Neurologie*, 1885, vol. ix. pp. 1, 145, 307.

back among the causal factors of both lateral and posterior sclerosis, but even maintains that damage to the cord by concussion of the spine, either local or general, is far more common than direct injury,—*i.e.*, injury resulting from fracture or dislocation, or from gunshot wounds or stabs. He divides the cases into three classes: First, “those in which the injury causes immediate and severe paralysis,” and here there may be either no discoverable change in the cord or as marked a lesion as myelitis. In the second class he places “those in which there are at first either no symptoms or only trifling disturbance of function, but in which grave symptoms come on a few days or weeks after the injury,” and, among others, records the following interesting case: “Thus a lady was severely shaken in a railway collision. She seemed, immediately after the accident, to have suffered no injury, but in a few days paraplegia developed, and from its consequence she died six weeks after the accident. Throughout the dorsal region of the cord I found indications of subacute myelitis, chiefly in the white columns, varying in its extent in different regions, but, in most parts, considerable in the pyramidal tracts.”

When these patients survive, recovery is slow, but may ultimately be very great. In other instances it may be limited.

In his third class he places those cases “in which there are no early symptoms, or only slight and transient disturbance, but at the end of one or several months symptoms gradually come on, often such as indicate disease of some definite system of structure of the cord,

degenerative in nature." This class, of course, includes the cases of lateral, posterior, and disseminated sclerosis already spoken of. Here is an example : J. D., aged 60, a marine engineer, had ten years ago a severe fall on the deck of a vessel. He fell from a height of ten or twelve feet, landing upon his right hip. The hip was severely injured, but not broken. He was confined to bed for several weeks, after which he was able to get about. His recovery, however, was never complete, and after a while he noticed that walking was becoming more difficult. Gradually he grew worse, and at present his gait is observed to be markedly spastic. The knee-jerks are exaggerated. There is no palsy of sensation. The sphincter of the bladder is paretic. No girdle sensations. No improvement during treatment.

I will not further take up your time in adducing evidence to prove that the spinal cord may be seriously and permanently damaged by blows or shocks which fail to produce injury of the spinal column. It is indeed, in my mind, no longer a matter of opinion. Neither shall I take up your time by a discussion of the manifold symptoms which these patients present, as such a discussion would not only be necessarily of great length, but would also be excessively technical, and therefore out of place here.

I shall pass at once to the second subdivision of group third of our classification, which deals with cases in which the symptoms point to a persistent loss of nervous tone, or to hysteria, or possibly a form of insanity, and in which no evidence of a structural injury



can be found. This class of cases includes some of the most difficult with which the expert has to deal. It is here that he must distinguish between the malingerer and the honest sufferer, for we must admit at the outset that traumatic neurasthenia and traumatic hysteria\* are matters of actual occurrence. From one stand-point these cases should hardly be considered under the head of spinal injuries, as they are affections of the nervous system as a whole, and they appear to be a result not only of the mechanical shock, but also of the excessive mental and emotional excitement accompanying the accident. In fact, the term railway brain has been suggested as more suitable to some of these cases. Page† under the head of "Shock to the Nervous System," discusses this condition at some length and tabulates its various stages and symptoms. He defines it as shock of the cranial contents without any structural lesions of importance. At the same time, he admits that "some of the symptoms . . . often remain for years as the sequelæ of severe concussions." He also states that while‡ "the great majority of cases may happily be placed in the stage of convalescence, there are occasional instances of persons who never reach it, having succumbed at an early date to the severity of the shock ;" and then he proceeds to cite two fatal cases,

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\* Charcot, "Leçons sur les Maladies du Système Nerveux," vol. iii. Also, Putnam, *Boston Medical and Surgical Journal*, September, 1883, p. 217. Also, Walton, *Archives of Medicine*, August, 1883.

† *Loc. cit.*, pp. 170 and 171.

‡ *Loc. cit.*, pp. 167 *et seq.*

one dying on the thirty-seventh day and the other in about five weeks after the accident. In this connection he says, "Though moderate in character, it (the accident) no doubt exercised a very unusual influence in depressing vital powers,—never very strong naturally,—and finally inducing such an amount of nervous exhaustion as to terminate fatally, even though there were no evidences before or after death of physical injury to any one part." The second point, then, that we have to consider is, that the consequences of "shock to the nervous system," or traumatic hysteria, or neurasthenia,—whatever we may choose to call it,—may vary greatly in degree. From a mere temporary fright or nervousness, that passes away in a few hours or days, we may have all grades of functional disturbance up to those that gradually deepen into death. Luckily, however, the latter result is a very rare one. Many, perhaps the majority of cases, undergo more or less marked improvement with the progress of time, though this improvement is rarely, if ever, complete. Convalescence is always gradual, often very prolonged, and often extending over years.

Sometimes, as already hinted, the symptoms are strikingly hysterical. There is unusual mobility of the emotions, globus hystericus, perhaps hysterical palsy, and even hysterical hemianæsthesia. At other times we have more the symptoms of a general depression of nervous tone. The man is irritable, perhaps morose or hypochondriacal, incapable of even slight exertion. He complains of headache, inability to fix the attention, loss of memory, and inordinate susceptibility to

the influence of alcoholic stimulants. "He may," as Knapp in his excellent paper puts it,\* "present no objective symptoms, but he remains an utter wreck. There is a general weakening, and a decline from the normal standard in the functions of the central nervous system, especially in the domain of thought, the will, and the emotions." In these cases, too, it should be remembered, a painful condition of the spine, probably neuralgic in character, persists, often for years.

I will not touch upon the various psychoses that occasionally follow trauma, other than to point out that the transition from such a condition of the nervous system as just described to that of actual insanity is merely one of degree. Krafft-Ebing† and others‡ admit its actual occurrence.

In order to impress upon you more fully the condition of patients who are suffering from a nervous shock, I will cite the following cases from my own experience :

An estimable middle-aged lady, a fine, plump, and wholesome-looking matron, whom I had known for a number of years, had been, with the exception of occasional slight muscular rheumatism, in a condition of perfect health. While travelling in a railway train, about a year ago, she left her seat in order to alight at a station which the train was approaching. It so happened, through some mis-

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\* Knapp, *Boston Medical and Surgical Journal*, November, 1888. (Reprint.)

† Krafft-Ebing, "Lehrbuch der Psychiatrie," Stuttgart, 1888, p. 184.

‡ Hartmann, *Archiv für Psychiatrie und Nervenkrankheiten*, 1884, vol xv. p. 98.

take of the railroad employés, that a freight-engine was standing on the main track. A collision of course was the result, and the lady was thrown violently upon her back on the floor of the car. She was somewhat shocked and considerably bruised. Intense aching and soreness of the back followed, and from having been a self-possessed and common-sense sort of woman, she became nervous, depressed, and at times burst into causeless tears. She seemed to worry and yet to have no special cause for it. Her facial expression, too, changed from that of quiet and contentment to that of trouble and concern. In addition, she looked decidedly older. Improvement, however, gradually set in some eight months after the accident, and now, at the end of a year, she is almost well. Her nervousness has almost altogether disappeared, and her spirits are again up to the normal. All this has happened without the balm of damages. Her backache, however, though much lessened, still persists, but not steadily, being only troublesome now and then.

This case illustrates, therefore, a mild instance of nervous shock. Here is another in which the symptoms were more pronounced and of longer duration.

A perfectly healthy woman, 30 years old, had all of her life been accustomed to hard work, had borne a number of healthy children, and at times during the illness of her husband served truck with a horse and wagon, being out for many hours at a time, exposed to all sorts of weather, and climbing in and out of her wagon many times a day. One day, while four and a half months pregnant,



she boarded a two-horse bobtail car. She took a seat near the back part of the car, sitting rather forward, so that her back was some distance from the back of the car-seat. The driver left his horses, still going at the same rate of speed, and entered the car to collect the fares. While thus engaged a collision occurred between the car and an odorless excavating truck. My patient felt a sudden jar, was thrown violently against the back of the seat, her back striking the back of the car-seat and her head the framework between two adjacent windows. She remembers nothing of what occurred immediately following, other than seeing some of the passengers re-entering the car. She felt faint and sick, and took the next car home. Could not eat any supper, and could not sleep that night because of pain in the back. Got up the next morning, but suffered so much that she was obliged to go back to bed. Was in bed for three days. Had also at this time considerable flow per vaginam. On the third day commenced passing her water every few minutes. Was obliged to get up for this purpose frequently at night. This has continued ever since. Her condition remained unchanged for a month, when on attempting some unusual exertion she became unconscious. On coming to, she discovered that she had lost power in the left arm and leg. These members were completely paralyzed. She improved, however, and at the end of a week was again able to walk, though she did so with difficulty. Three months later, when I first saw her, the left leg was still weak. I made at the time the following note: On stripping the patient and examining the

spine two very tender spots are detected, one over the seventh cervical vertebra and the other over the sixth or seventh dorsal. Lesser but decidedly painful areas are discovered in the lumbar and sacral regions. Grip of the left hand decidedly diminished. Left leg drags perceptibly in walking. Stands well on the right foot, but is in danger of falling when attempting to stand on the left. Knee-jerk excessive on the right side and diminished on the left. Complains that the left leg and arm feel dead and numb, especially the leg. When examined by the æsthesiometer, the responses are decidedly slow. On the right side they are immediate. On the left side she separates the points either not at all or with difficulty. On the hand the points must be two and a half to three inches apart before she recognizes a dual impression. On the arm she cannot separate them at all. On the leg there is a patch of absolute anæsthesia on the outer aspect of the calf. On other portions of the limb sensibility is merely diminished. On the right side the responses are everywhere normal. At the time of this examination she was eight and a half months pregnant.

The patient continued in this state, without any change of her symptoms beyond some increase in the weakness of the left side, until she fell in labor. The latter, which was very unusual in her case, was very prolonged, lasting three days. It was terminated, however, without the use of instruments. On the second day following she commenced to have headache and a diffused pain in the entire left side. This headache persisted for some six weeks. Two weeks after her accouche-

ment she left her bed. Walked, however, with great difficulty, and on one day the loss of power on the left side was again all but complete.

Four weeks afterwards she was examined again. There was continual aching all down the spine, but the tender spots before noticed had disappeared. She was still compelled to pass her water very frequently, though she thought that she was a little better in this respect. The left hand, too, had gained somewhat in strength. The right leg now was weak, more so, indeed, than the left. The knee-jerk was much diminished on both sides. Cutaneous sensibility of left side was improved, though still below normal.

For one month following she continued to improve, the improvement, especially in walking, being very marked. Then she reached a stand-still, the backache, headache, weakness, and numbness being now better and now worse. Her general nutrition and color excepted, no decided change in her condition could be noted several months later. At the present time, a year and a quarter after the accident, her symptoms persist, though in a lessened degree, especially the headache, backache, and weakness in the knees.

I should state that in this case, though it involved a suit for damages, the period of the improvement bore no relation to the time of the trial, the maximum improvement taking place some six months previous to the latter.

In this case, then, the nervous shock, influenced no doubt also by the fact that it occurred in a pregnant woman, resulted in a pronounced hysteria, and that, too, in a

woman who had previously had a robust and fibrous temperament.

It will lend additional interest to this case when I tell you that the child born of this woman has epilepsy. The seizures commenced shortly after birth, and continue now at irregular intervals. They appear to be in every way typical, and average three or four a week. No member of her family has ever suffered from this disease. Surely this looks like a case of maternal impression, and suggests to us how profound the shock must have been to the nervous system of the mother.

Another case is that of a man, and is particularly interesting as being the outcome of a series of accidents. The following is his history: M. C. B., aged 47, married, and at present is an oil distributor in the employ of the Pennsylvania Railroad. Was born in Missouri. Claims to have come from healthy stock. Was perfectly well up to eighteen years of age. At that time contracted gonorrhœa and a venereal sore. Did not suffer from any sequelæ that he can remember. Married later, and has had a family of apparently healthy children. Wife has had no miscarriages. One child died shortly after birth, said to have been a "blue baby."

His own health had always been good, and for this statement I have not only his own assurance, but also that of his wife. In 1877 he was injured as follows:

He was working as a brakeman on the Pennsylvania Railroad, and while coupling cars his body was caught between the "nigger-heads" of the tank of the engine and of the cabin. He was badly squeezed from before



backward, so severely, indeed, that it seemed to him as though the edges of his lower ribs touched his backbone. He was in this position fully five minutes. He was not senseless when he was extricated, but would certainly have fallen to the ground had he not been caught by his mates. He was taken to the University Hospital, where he remained upward of five weeks. At the end of the fourth week he could stand, and before the end of the fifth he was able to walk around the hospital. Thinks now that he could have walked earlier had he tried. He was, however, exceedingly nervous, and on returning to his position he found that the sight of a passing train made him giddy. His feet and legs were also exceedingly cold. He also had backache, headache, and slept badly. He continued without marked change in his condition until 1880, when he met with another accident. This time he was struck in the back by the bumper and iron step of a cabin, the latter moving, he asserts, at a rapid rate. He was knocked senseless and received a scalp wound, but, strange to say, returned to his work two days afterwards. His backache, headache, nervousness, and giddiness all increased in severity. He also noticed that he could not see as well as before. In 1881 he had still another accident, and this seems to have been the last straw that broke the camel's back. While coupling cars three fingers of the left hand were caught and mashed. Two of them required partial amputation. His nervousness, sleeplessness, and pain in the back were now worse than ever. The backache was at times so bad as to absolutely interfere

with his work. He was now an oil distributor. Some six months after this accident, being on night duty, he returned home in the morning and, after a slight altercation with his son, went to bed. After sleeping about an hour he awoke screaming with all his might. He screamed for several minutes, was perfectly conscious, but was utterly unable to control himself. After this his general condition remained about the same until 1887, when he had another screaming spell. These spells recurred and soon became very frequent. Sometimes he had as many as two spells a day, and they occurred indifferently during his waking or sleeping hours. He was always conscious during the attack. 'The spells have been less frequent of late. Before the attack comes on he feels as though something were being pumped up his back, and "by the time it reaches his throat it bursts" and he *must* scream; there is no help for it. After the spell is over he feels as though something were running down through his trunk, the sensation being very much like that which is conveyed to "the hand in grasping a garden-hose through which water is running."

In addition to these undoubtedly hysterical symptoms, the man has still a painful back, and which is very tender on pressure. Headache is also a frequent symptom. Clavus hystericus is sometimes present. He says that at times his calves are anæsthetic, but this, if true, is a variable symptom. He is also constantly complaining of new and strange pains and aches.

There is no contraction of the field of vision, but Dr. de Schweinitz reports that the

optic nerves are gray. There is also a very slight inequality of the pupils, but this appears to be normal. Response to light and accommodation are also normal.

This case, then, appears to be one, all things considered, of very pronounced hysteria and neurasthenia, and undoubtedly the various traumas received were the essential causes.

Before closing, let me impress upon you again that the classification of spinal injuries I have proposed is purely arbitrary, and, while most cases permit of being classified under some special head, others may be found in which the symptoms are referable to two or more divisions of our classification. It is possible, for instance, that a sprain of the back be accompanied by damage of the spinal contents or *vice versa*, or that either of these conditions be accompanied by hysteria. The mere presence of sprain of the back should not, therefore, lead the expert to ignore the possibility of injury to the cord, nor, on the other hand, should the presence of undoubted hysterical symptoms lead the expert to ignore the possibility of actual structural change. However, it is the duty of the expert, whenever possible, to separate the organic affections from the purely neurasthenic or hysterical. The distinction is a vital one, inasmuch as it affects the future of the case and of course the result of the suit for damages. As regards the prognosis of hysteria, its degree and the concomitance or non-concomitance of neurasthenia are to be considered. Simple uncomplicated hysteria, it must be remembered, offers, other things equal, far

better chances of recovery than simple neurasthenia, especially when the latter is profound. As a matter of fact, however, hysteria and neurasthenia so often go hand-in-hand that a sharply-drawn distinction cannot always be made. Again, neurasthenia is to be considered, other things equal, as the more serious the more pronounced the mental symptoms, remembering that actual insanity, though rarely, may supervene.

Lastly, regarding malingerers,—that is, those whose affection is neither hysterical, neurasthenic, nor organic,—the expert must rely largely upon his mother-wit for the detection of the fraud. Distinction between actual and simulated organic disease can, as a rule, be readily made, though between simulated disease and hysteria the line is sometimes hard to draw. Hysterical functional disease is, however, *real as far as the patient is concerned*, and needs *no active effort* on the part of the patient to maintain its outward manifestations, while in the malingerer a *constant effort* is required, and if closely watched he may be caught napping. Further, there is a marked difference, as a rule, in the mental attitude. The hysterical patient is generally emotional in the extreme, and presents such typical symptoms as globus hystericus, clavus, or even typical hysterical hemianæsthesia. The malingerer is, on the other hand, a complacent, often argumentative, liar, and occasionally displays a superficial familiarity with technical terms, as though he had studied his part. Not infrequently he contradicts himself, and can, by leading questions, be trapped into the grossest absurdities. Neu-



raesthesia, as already stated, is so frequently wrapped up with hysteria that here another point of difference can be sought for. The malingerer, of course, bears upon his face, other things equal, the aspect of health; shows no change in his pulse or heart's action; there is nowhere any evidence of vaso-motor relaxation, no cold and bluish extremities, no change in the reflexes, etc.

This brief summary would be incomplete if I did not point out the danger to which the expert is exposed by the exaggerations, voluntary or involuntary, of people who are really hurt or who honestly believe that they have been hurt. The investigation must be both detailed and exhaustive, and the patient should be encouraged to talk, and talk freely, while the doctor should be a quiet listener, carefully weighing and recording each statement. After all, it will be his common sense and native acumen which will guide him in his conclusions.







